

Elementary Science Assessment Resource Pilot

Grade 6



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Department of Education
Evaluation & Research Division

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“Science, it’s all around you! It’s part of our everyday life.”

“My absolute favorite part of science is experiments. Mixing and stirring different formulas, then waiting and waiting while the suspense builds up in you and BANG! White soda fiz pours out slowly overlaying the glass tube.”

“You never know what you are going to do in science, that’s what makes it exciting. You might go out to study the rocks or plants, or you might go out and pick up some of the garbage, or you might go on a field trip.”

Grade 6 students, NL

Complete the table below showing the similarities and differences among all living things.

| Similarities Among All Living Things | Differences Among All Living Things |
|---|--|
| | |

Describe one difference between each pair of animals below and explain how that difference helps each animal survive in its habitat.

- A. brown bear and polar bear
B. red fox and arctic fox
C. beluga whale and killer whale

[illegible]

Fred, a scientist, is studying living things in Africa, and groups all the frogs, toads, and lizards (cold-blooded creatures) in a group called “grogs”. Marie, another scientist doing a similar study, groups frogs, fish, and whales (water creatures) together and calls them “moists”.

1. Are Fred and Marie grouping their living things the same way? (Yes / No)
2. Is one method better than the other? Explain.

3. Could they compare their results of their investigations? (Yes / No)
4. If every scientist grouped living things the way they wanted, and called their groups by different names, what problems would it cause when they talked to each other about their ideas?

5. Why do scientists in all parts of the world use Latin to name living things? For example, scientists in China and scientists in Canada name balsam fir as *Abies balsamea*.

Some common arthropods are crabs, lobsters, crayfish, shrimp, spiders, scorpions, ticks, mites, and insects.

1. Research information on one of the arthropods listed above. Your research should include:
 - a. Labeled illustration of your arthropod in its environment
 - b. Common Name & Scientific Name
 - c. How it moves from place to place
 - d. How it attains its food
 - e. How it avoids predators
 - f. How it is suited to its environment
2. Compare the arthropod you researched with a different one from another student. List the similarities and differences.

Comparison of Two Arthropods:

_____ & _____

| Similarities | | Differences | |
|--------------|--|-------------|--|
| | | | |

Use the information from page 23 of your science text book to complete the table below.

| Insect | Type of Food | Mouth Adaptation for Feeding |
|--------|--------------|------------------------------|
| | | |
| | | |
| | | |
| | | |

Refer to pages 26 to 29 of your science text book to complete the activity below.

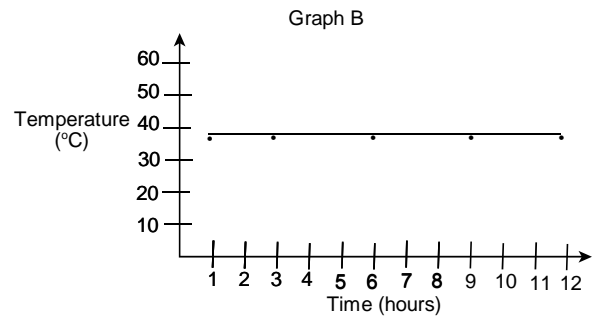
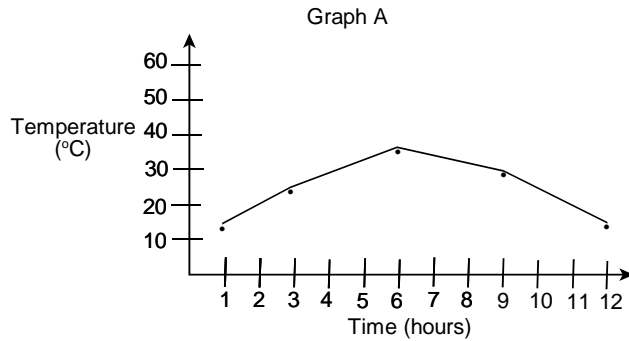
Why are the animals below not classified as arthropods?

| | |
|------------|--|
| sea squirt | |
| turtle | |
| frog | |
| tapeworm | |
| octopus | |
| snake | |
| vulture | |

Classify the animals below by completing the table with yes or no.

| Animal | Vertebrate | | | | | Invertebrate | |
|------------|------------|------|---------|-----------|------|--------------|---------------|
| | mammal | bird | reptile | amphibian | fish | Arthropod | Non arthropod |
| sea squirt | | | | | | | |
| turtle | | | | | | | |
| frog | | | | | | | |
| tapeworm | | | | | | | |
| lobster | | | | | | | |
| octopus | | | | | | | |
| snake | | | | | | | |
| vulture | | | | | | | |

Graph A and Graph B show the body temperature of an animal over several hours.



1. Which graph represents a warm blooded animal? Explain.

2. Which graph represents a cold blooded animal? Explain.

3. Name a vertebrate that could be represented by:

Graph A: _____

Graph B: _____

1. List the harmful and helpful effects of microorganisms below by referring to page 40 and 41 of your science text book.

| Helpful Effects of Microorganisms | Harmful Effects of Microorganisms |
|-----------------------------------|-----------------------------------|
| | |

2. What are some ways to control the growth of harmful microorganisms?

Extension Activity

Research an example of common, harmful microorganism that can be found in food such as e-coli, salmonella or botulism. Include a labeled illustration or clip art of the microorganism. Explain what it is and how it gets into food. Investigate how science and technology work to enable us to prevent these microorganisms from getting into our food or from being spread to work areas where food is prepared.

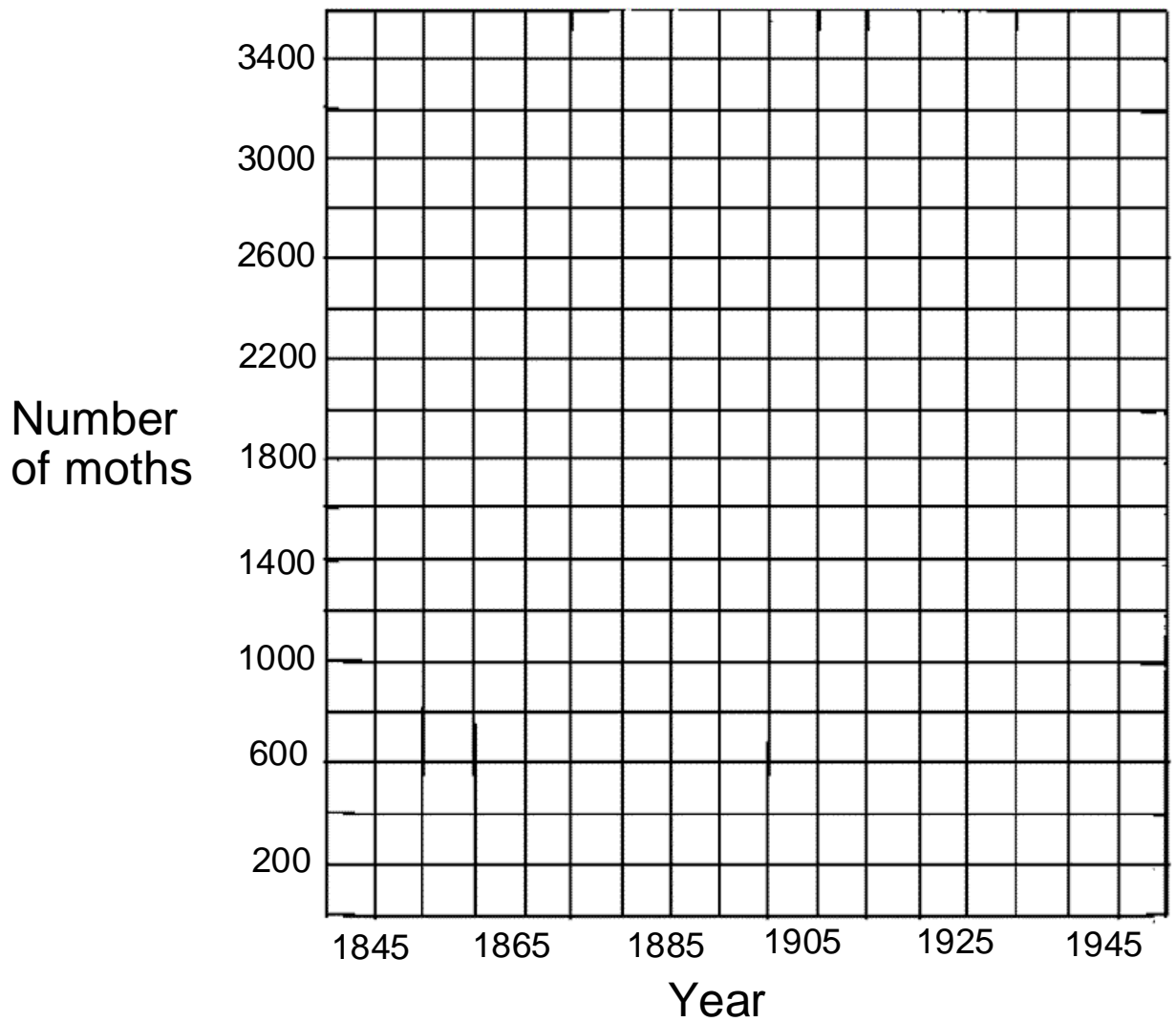
Refer to page 44 of your science text book to complete the activity below.

1. Why did the number of dark-coloured pepper moths increase and the number of white-coloured moths decrease due to the pollution?

2. How does this represent natural selection?

3. Using the data below, draw a bar graph showing the change in population of the black moths and white moths from 1845 to 1945.

| | Estimated Population of Peppered Moths | | | | | |
|--------------------|---|-------------|-------------|-------------|-------------|-------------|
| Year | 1845 | 1865 | 1885 | 1905 | 1925 | 1945 |
| Black Moths | 100 | 200 | 400 | 800 | 1600 | 3200 |
| White Moths | 3200 | 1600 | 800 | 400 | 200 | 100 |



A. brown owl and snowy owl
B. black bear and brown bear
C. northern elephant seal and southern elephant seal

[illegible]

What would the following discoveries indicate about Earth's history?

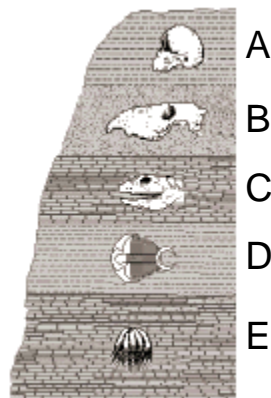
1. Finding the same type of fossil in Marystown and Paris.

2. Finding the fossil of a land animal under water.

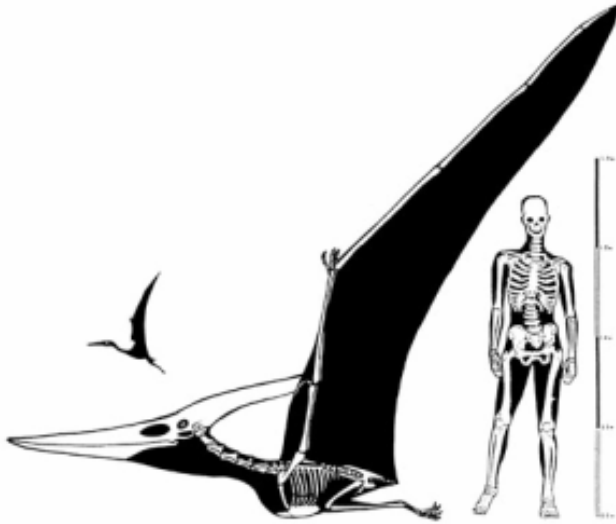
3. Finding the fossil of a marine animal on the top of Mount Everest.

Paleontologists use relative dating and absolute dating techniques to determine the age of fossils.

Relative dating involves comparing the layers where fossils are found. The diagram below shows fossils buried in layers of rock underground. In which layers of the rock below are the fossils oldest and in which are they youngest? Explain.



Most animals become extinct as a result of losing their habitat or food supply. The diagram below shows the extinct animal, pterodactyl. Using the theory of natural selection, how do you think the pterodactyl became extinct?



Animals usually do not become extinct instantaneously. They are designated as endangered species. This is done to make people aware that the animal will become extinct if nothing is done. There are many examples of endangered species in Newfoundland and Labrador. Design a plan that would help protect one of the animals below from becoming extinct in our province. Your plan should provide background information on the description of the animal and why it became endangered.

Piping Plover
Pine Marten
Newfoundland Pony
Wolverine
Harlequin Duck
Atlantic Cod

Some information may be found on Environment Canada's Species at Risk website, http://www.speciesatrisk.gc.ca/default_e.cfm

Extension Activity

Design a poster/pamphlet to inform the public about the issue and encourage them to get involved.

Unit: Turn It On!

Lesson 1 Activity 1 (105-3)

Think of three activities you did to get ready for school this morning that involved using electrical appliances. Explain how you normally do these things, and then explain how you would accomplish these activities without using electricity.

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

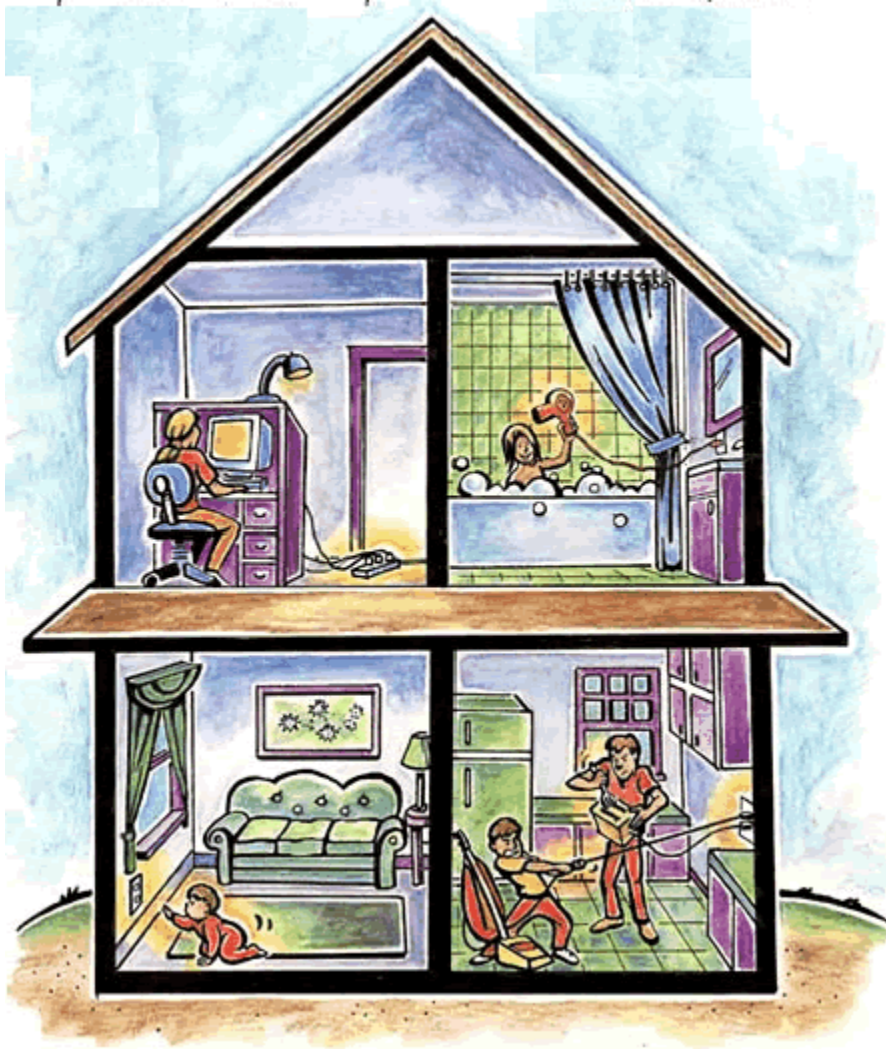
Unit: Turn It On!

Lesson 1 Activity 2
(105-3)

Illustrate all the ways you used electricity to get ready for school today.
Write a caption for each and then draw a corresponding illustration on how you could do these activities without electricity.

| With Electricity | Without Electricity |
|------------------|---------------------|
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |
| _____ | _____ |

List five electrical hazards in the house below.



Unit: Turn It On!

Lesson 2 Activity 2
(303-31)

Make a public service advertisement which provides safety information about electricity. Focus your advertisement on the electrical hazards you observed in the previous activity.

Identify three situations in your school where energy is being wasted. Develop strategies to conserve energy for each situation.

[illegible]

Identify situations in your school where energy is being wasted. Develop strategies to conserve energy for each situation.

| Wasted Energy in Your School | Strategies to Conserve Energy |
|---------------------------------------|---------------------------------------|
| Lights left on | |
| The heat is on while windows are open | |
| Computers left on | |
| | Seal windows tightly to avoid drafts |
| | Turn down heat when school is closed. |
| | |

When a balloon is rubbed with wool it can stick to a wall. Explain why this happens.

Use the word bank to complete the passage.

| | | | |
|-----------------|-----------------|-----------|-----------|
| repulsion | electrons | attracts | electrons |
| negative charge | positive charge | electrons | shock |

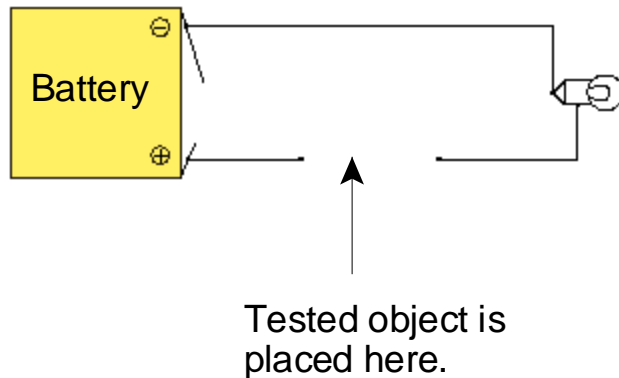
When you are home, you walk on carpet with socks on your feet. By rubbing your socks on the carpet you are stealing _____. When you touch the doorknob you have a buildup of _____. You have a _____ and the doorknob has a _____. So your negative charge _____ the positive charge on the doorknob, causing the _____ to jump from you to the doorknob. This results in a _____ . _____ does not happen because the doorknob does not have the same number of electrons as you do, according to the Attraction Laws.

Unit: Turn It On!

Lesson 4 Activity 1
(303-22)

Use a Venn Diagram to show the similarities and differences between current and static electricity.

A plastic spoon, wooden ruler, and a metal compass were tested for conductivity using a test unit similar to the one shown below.



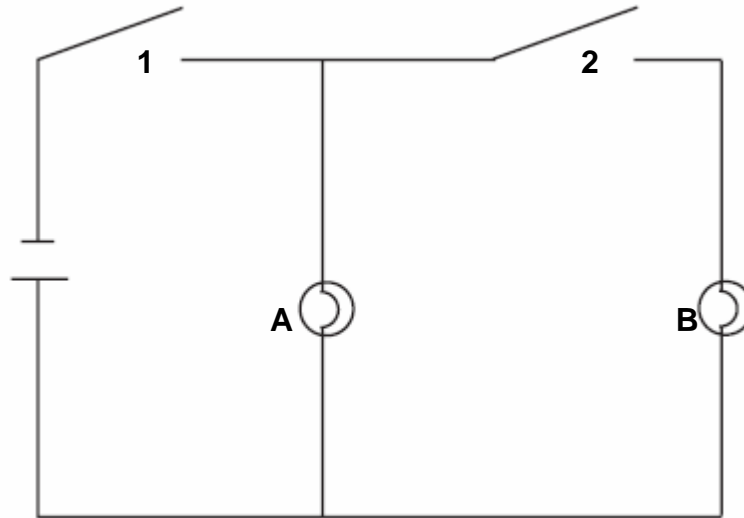
1. How do you know a positive test occurred? Explain why this happens.

2. Which objects would produce a positive test? _____

3. Which type of objects produce a negative test? Explain why.

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Refer to the circuit diagram below to answer the questions that follow.



1. What light bulbs (A, B, neither, or both) will be “on” if:
 - a. Switch 1 is open and Switch 2 is closed. _____
 - b. Switch 1 is closed and switch 2 is open. _____
2. What happens to the brightness of the light if a second bulb is added to a series circuit? Explain.

1. How is a fuse like a switch? Explain.

2. Is a circuit open or closed when a light switch is “turned on”? Explain using your knowledge of circuits. Use a diagram to help support your response.

Refer to pages 24 and 25 in your science text book to complete the activity below.

1. What do you need to make an electromagnet?

2. What affects the strength of an electromagnet?

3. Give three examples of devices that use electromagnets. State the role of the electromagnet in each device.

4. What advantages are there in being able to turn an electromagnet on and off?

Unit: Turn It On!

Lesson 8 Activity 1
(106-4, 303-28)

Draw a Venn diagram to compare and contrast electromagnets and generators in terms of what they are made from, their source of energy, and what they do.

Use these key words to help you create your diagram:

Gas power

Needs electricity

Electric power

Iron core

wire coil

gas power

battery power

makes electricity

magnet

manual power

power source

daily use

Choose either chemical, mechanical, or solar energy to research. Once you have completed your research, present your findings in the form of a collage, skit, song, or poster.

Include the following three points:

- a. how electrical energy is produced from the source
- b. whether the source is renewable or non-renewable
- c. positive and negative impacts on the environment of using this source to create electricity

Unit: Turn It On!

Lesson 9 Activity 2
(303-28, 105-3, 108-8)

Hydroelectricity is the source of electricity used to supply our homes in Newfoundland and Labrador. Construct a before and after poster to show an environment before a hydroelectric plant was built and the environment after the hydroelectric plant was built.

Use this page to organize your poster. Be sure to include titles, labels, captions, and/or explanations. Try to use various sources of media as sources of information and graphics.

1. Locate five devices in your house that are used almost everyday and record the number of hours they are running each day for five days.

| Electrical Device | Number of Hours | | | | | |
|-------------------|-----------------|-------|-------|-------|-------|-------|
| | Day 1 | Day 2 | Day 3 | Day 4 | Day 5 | Total |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |
| | | | | | | |

2. The amount of energy an electrical device uses is called a **watt**. The number of watts used per hour by a device can be located in raised numbers directly on the device, or on a metal plate attached to it. Record the watts used per hour for each device and the total number of watts used over five days in the table below. Refer to page 36 in text.

| Electrical Device | Watts per Hour | Total Hours Used Over Five Days | Total Watts Used Over Five Days |
|-------------------|----------------|---------------------------------|---------------------------------|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

3. Which electrical device used the most energy? Explain why you think this is so.

4. List three ways that you could reduce the amount of energy used by this device.

Indicate in the table below the purpose of the electrical device. Think of three on your own to complete the last three rows.

| Device | Heat | Motion | Sound | Magnetic | Light |
|----------------|------|--------|-------|----------|-------|
| toaster | | | | | |
| kettle | | | | | |
| electric drill | | | | | |
| speaker | | | | | |
| clothes dryer | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

Unit: The Sky's the Limit

Lesson 1 Activity 1
(205-5)

Complete the first two columns of the K-W-L chart below. Complete the third column at the end of the unit.

| What You Know About Flight | What You Would Like to Know About Flight | What You Learned About Flight |
|----------------------------|--|-------------------------------|
| | | |

Garbage Bag Air Craft

Obtain a large, industrial size, garbage bag or a dry-cleaning bag. Tie small rocks on the inside corners of the bag with string to keep the bag still. Hold the bag upside down and squeeze all air out. Use a hair dryer to blow hot air into the bag. Fill the bag completely with hot air.

Note: For best results, this activity should be done in a colder environment, such as outside. The greater the difference in temperature between the air inside the bag and the air outside, the greater the lift.

1. Use a labeled diagram to show what happened to the bag.

2. How does this activity represent the technology used in early aircraft? Refer to page 11 of your science text book.

3. Give an example of how this technology is used today.

Bernoulli's Principle states that an increase in the speed of a gas or liquid causes a decrease in pressure. The principle of reducing pressure to cause an object to move into the low pressure area is the same one that causes airplanes to lift. See the diagram on page 21 of your science text book.

The movement of a shower curtain after a shower is turned on shows Bernoulli's principle. Describe how it represents Bernoulli's principle. Use a diagram in your description.

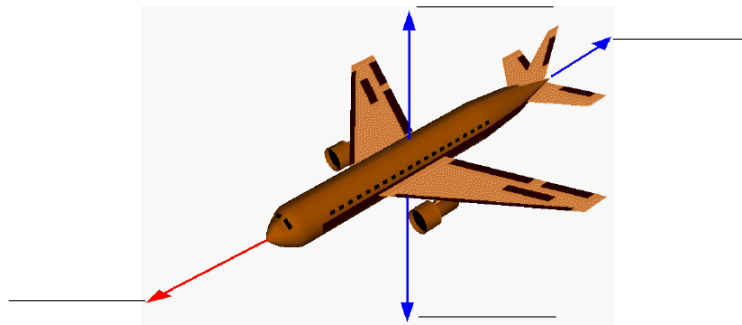
The speed of the water _____ (increases/decreases) causing a _____ (low/high) pressure.

The pressure on the outside of the curtain is _____ (high/low) because the air is _____ (slow/fast).

This causes the air on the _____ (inside/outside) of the curtain to push because air moves from _____ to _____ (high/low) pressure.

The four main forces involved in flight are lift, gravity, thrust and drag. Lift is caused by the difference in air pressure when air flows under and over an airplane's wings. Lift is opposed by the force of gravity that is pulling downward on the airplane. Thrust is caused by the action of the propellers moving the plane forward. Opposed to thrust is drag that is caused by air resistance.

1. Label these forces in the diagram below.



2. Which forces of flight oppose each other?

_____ and _____
_____ and _____

3. What is the role of lift in flight?

1. Describe what happens to you when you try to run in the shallow end of a swimming pool. How does this demonstrate drag?

2. If you run in the same swimming pool without water, will there be a difference in drag? Explain.

3. Is there still drag in the pool with no water considering that air is still in the pool? Explain.

4. How do you think cyclists, such as Lance Armstrong below, reduce drag when competing in the Tour de France? Consider streaming and aerodynamics.



Thrust is the force that causes propulsion. There are two main types of propulsion:

- A. propulsion based on gases being projected away from the plane
(pushing the plane through the air)
- B. propulsion pulling the plane through the air.

Which type of propulsion (A or B) is used in each aircraft below?









Why do spacecraft not use type B?

Aircraft rely on an atmosphere so they have large wings, engines, and propellers. Spacecraft fly in space so they have small wings, rudders, and large booster containers for fuel.

1. The space shuttle has structures common to both aircraft and space craft. Identify these structures in the table below.



| Aircraft Structures | Spacecraft Structures |
|---------------------|-----------------------|
| | |

2. Why does the space shuttle have structures common to aircraft and spacecraft?

2. Why does the space shuttle have structures common to aircraft and spacecraft?

3. The spacecraft below was built to travel in space only. How do you know? Explain with reference to the structure below.



Streamline

Take three sheets of paper, which are the same size. Throw one sheet of paper horizontally, and measure the distance it traveled. Crumple one sheet of paper into a ball and throw it horizontally. Measure the distance it traveled. Make a paper glider with another sheet of paper and throw it horizontally. Measure the distance it traveled.

1. Which piece of paper traveled the furthest distance? Why?

2. Which piece of paper traveled the least distance? Why?

3. What variable are we testing in this activity?

4. Which variables must remain constant to make sure that it is a fair test?

5. How would you change the design of your paper glider to make it travel farther?

6. Which car below would be more streamlined? Explain with reference to each picture?



Model T Ford



Lamborghini

7. Why do engineers design cars to be more streamlined?

Refer to page 33 of your science text book to complete the activity below.

1. What is a wind tunnel?

2. How are wind tunnels used in aircraft design?

3. Why are wind tunnels appropriate methods for testing and design aircraft?

Research the contribution made to the science and technology of aircrafts by one of these Canadians. How did their contribution influence further developments in the aircraft industry? Organize jot-notes into categories: statistics, training, accomplishments, etc.

Once the information has been gathered, prepare a presentation in the form of a diorama, dramatic skit, song, artistic presentation, etc.

Molly Reilly
Billy Bishop
Robert Noorduyn

Elsie McGill
Alexander Graham Bell
Wallace R. Turnbull

Violet Milsted
Madge Graham

[illegible]

Eagles hunt small animals on the forest floor from high in the sky. Hummingbirds feed on the nectar of flowers while in mid air. Gannets dive underwater to feed on fish. Describe how the wings of each bird are adapted to help them feed?



A photograph of a fish, likely a salmon, captured mid-jump above the surface of dark, rippling water. The fish is oriented vertically, with its head pointing upwards and its tail downwards. Its body is mostly white with a hint of orange on its tail. The background is a dark, textured expanse of water.

diving gannet

[illegible]

Complete the first two columns of the K-W-L chart below. Complete the third column at the end of the unit.

| What You Know About the Solar System | What You Would Like to Know About the Solar System | What You Learned About the Solar System |
|--|--|--|
| | | |

Complete the table below and use the information to construct a line graph. Make sure the graph has a title and the axes are labeled.

| Planet | Distance from the Sun (km) |
|---------|----------------------------|
| Mercury | |
| Venus | |
| Earth | |
| Mars | |
| Jupiter | |
| Saturn | |
| Uranus | |
| Neptune | |
| Pluto | |

[illegible]

Refer to page 6 of your science text book to complete the chart below.

| Planet | Actual Distance | Decimal Notation to the nearest Billion |
|---------------|------------------------|--|
| Mercury | 58 000 000 km | |
| Venus | | 0.108 billion |
| Earth | 150 000 000 km | |
| | 228 000 000 km | |
| Jupiter | | 0.778 billion |
| Saturn | | 1.424 billion |
| | 2 867 000 000 km | 2.867 billion |
| Neptune | 4 488 000 000 km | |
| Pluto | | 5.91 billion |

Refer to page 9 of your science text book to complete the activity below.

Draw coloured illustrations of a comet, meteoroid and asteroid. Make sure your illustrations clearly show the differences between each.

1. Describe three ways in which planets are different from stars.

2. On a separate sheet of paper, write a short story about space travel. Which planet would you like to visit? How long would it take to get there? What would you see when you arrived? Could you walk on the planet? What kinds of things would you experience?

Refer to page 16 and 17 of your science text book to complete the activity below.

1. What changes as Earth rotates?

2. What changes as Earth revolves around the sun?

3. In the past, many people believed that Earth was the centre of the solar system. How has this belief changed? What information caused people to change their belief?

Refer to page 18 of your science text book to complete the activity below.

Question: How does sunlight affect Earth?

Hypothesis: _____

Materials: _____

Procedure: Refer to page 18 of student text book.

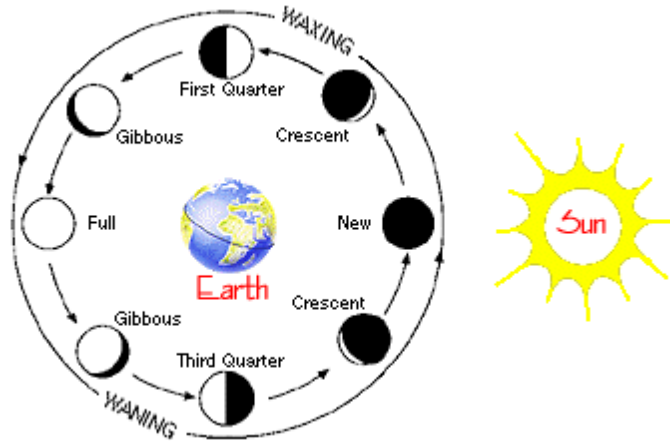
Results:

1. (a) During which **season** of the year does sunlight shine straight down on the northern hemisphere? _____
 - (b) During which **season** of the year is the northern hemisphere tilted away from the sun? _____
 - (c) Why is it generally warmer in Florida than it is here in Newfoundland?

2. Describe how sunlight hits Earth at the equator over the course of a year.

Conclusion:

Earth's moon does not give off any light. We see the moon when light from the sun reflects off it. We usually only see parts of the moon. From Earth it appears that the moon changes shape during a calendar month. These changes are referred to as phases of the moon. Refer to the diagram to answer the questions below.

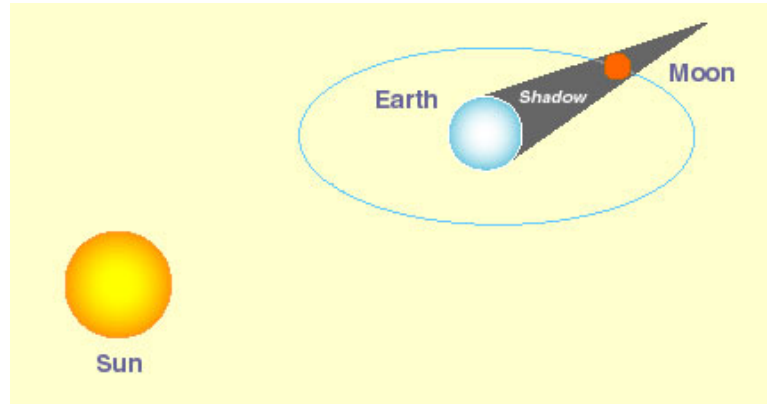


1. How much of the moon can you see during the New Moon? _____
2. How much of the moon can you see during the Full Moon? _____
3. What is a waning moon?

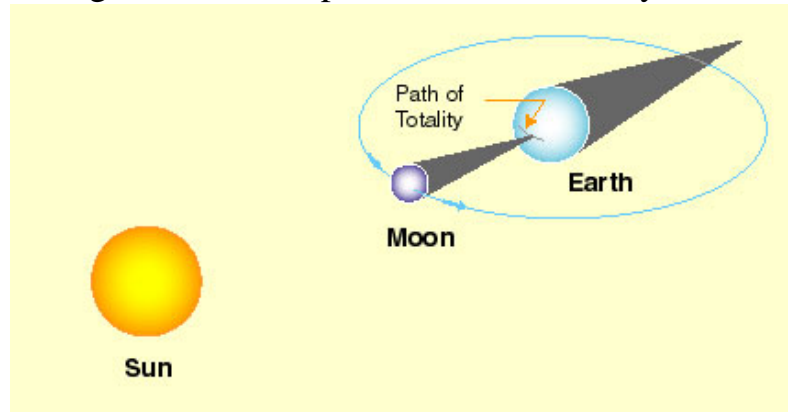
4. What is a waxing moon?

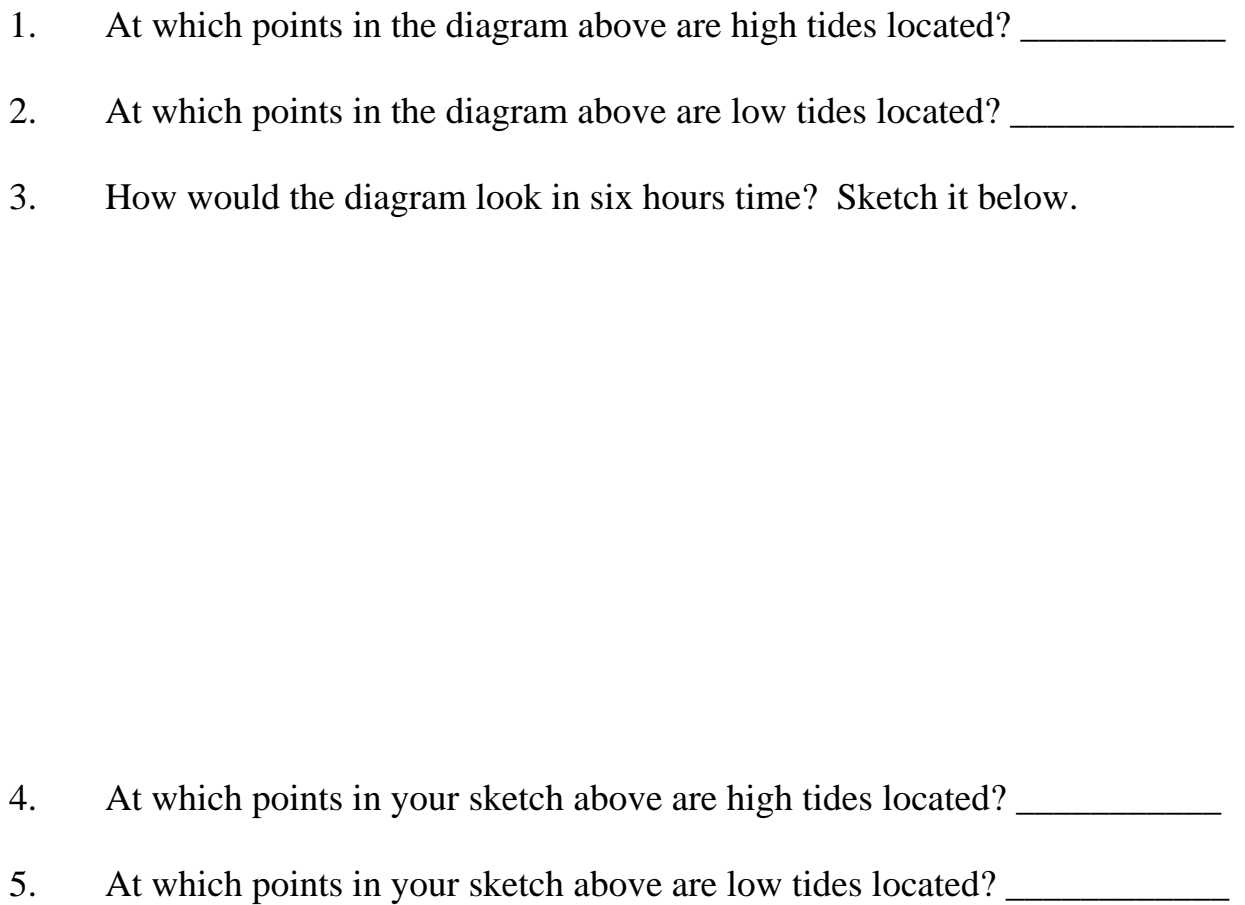
5. On a separate sheet of paper, compare the phases of the moon to stages in a person's life. Describe each life stage and explain why you compared each life stage to a phase of the moon.

1. Using the diagram below, explain what is meant by a lunar eclipse.



2. Using the diagram below, explain what is meant by a solar eclipse.





Refer to pages 32 and 33 of your science text book to complete the activity below.

1. Do we always see the same stars when we look out at night? Explain.

2. Do the patterns of stars change over the year? Explain.

3. Could people in the southern hemisphere use the North Star to find their way? Why or why not?

4. How do you think astronomers estimate the number of stars in the universe?

If you could build a new telescope, where would you build it and why? When thinking about where you would build your telescope, consider the weather, the altitude (height of the land) and how close it is located to a city.

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Provide a description of each of the pieces of equipment listed below:

Land Rover Buggy
Hubble Telescope
Canadarm
Space Probes
Satellites

Next, find a picture of each in your textbook or in classroom resource books.
Illustrate one of the pieces of equipment in the space below.

The Canadarm

Canadians are responsible for one of the most significant advances in space engineering—the Canadarm. Actually called the Shuttle Remote Manipulator System, one of the Canadarm's most impressive engineering achievements is its ability to capture a free-flying payload in a zero gravity environment. The slightest contact with an object in space, regardless of size, will send it spinning away. Astronauts have to be able to control a 50-foot arm over a wide range of commands and for a wide range of payload sizes. Operating the Canadarm may mean moving it very accurately and slowly over a distance of millimetres or it may



mean moving it precisely over several metres at a very high speed. During more than 50 missions and after 7000 orbits around Earth, the Canadarm has never malfunctioned. Indeed, it is used to help solve other problems on the shuttle, everything from knocking ice off the fuselage of the Orbiter to fixing the Hubble Space Telescope. It is also instrumental in assembling the new international space station. The Canadarm is truly one of the greatest Canadian engineering achievements.

Based on the information above, how has the Canadarm changed space exploration and how will it affect future missions in space?

The sun is a star that provides energy for the planets that revolve around it. We see many stars in the night sky. Imagine if each of these stars were the centre of their own universe with planets revolving around it. Describe the solar system for one of the stars. Be creative and remember no idea is too far fetched because at one time humans used to think that Earth was flat. Use the questions below to guide some of your thoughts.

1. Name your star and five planets.
2. What is the weather like?
3. Is there life on any of the planets? If so, then what type of life is present there?
4. How big are the planets? How far are the planets away from their sun?
5. What are some of the geographical features of the planets?
(valleys, lakes, volcanoes, ice caps)

1. How do you think our solar system would be different if the sun were a hotter star?

2. How do you think our solar system would be different if the sun were a cooler star?

Refer to pages 42 and 43 of your science text book to complete the activity below.

Do you think the space shuttle is an improvement over earlier rockets? Explain why or why not.

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.

1. While in space, astronauts must meet their basic needs. In the table below, identify a basic need and how it is met in space.

| Basic Need | How it is met |
|------------|---------------|
| | |
| | |
| | |

2. What is meant by space spin-offs? Give three examples of space spin-offs.

3. How would you be able to play soccer in microgravity? Describe changes in any of the rules or equipment.
